Abstract

This study was aimed to isolate and investigate the microorganisms able to degrade bioplastic (Poly-β-hydroxybutyrate) from different environmental sites, observation of the extent of biodegradation of bioplastic and optimization of degradation process. In the present study PHB degrading microorganisms were isolated from different sites and investigated for their biodegradative ability, 6 bacterial isolates and 2 fungal isolates were found to be able to grow on mineral salt medium containing PHB as sole carbon source. Bacteria able to grow on this medium were selected and a comparative test of biodegradation was performed by employing clear zone formation method. Bacterium with highest degradation rate, determined on the basis of diameter of clear zone (17±0.18 mm), was selected for degradation optimization. Biodegradation of PHB was determined through Sturm test, where 1.97 g/L of CO_2 and 26.87 percent (w/w) of PHB degradation was determined. For the further confirmation of the presence of biodegradation process scanning electron microscopy and FTIR spectroscopy of PHB films used in Sturm test was performed. Scanning electron micrographs showed formation of grooves, pits and cracking on PHB films. FTIR spectra of PHB films before and after test showed formation of some new bonds between 1300/cm to 1700/cm region due to breakage of C-O bonds. The optimum conditions to achieve maximum biodegradation of PHB were studied and increase in degradation rate, in terms of clear zone dimeter formation from 17±0.18 to 23±0.15 mm (1.35 fold) was detected when GC1b bacterial strain grown on mineral salt medium, containing 0.2% (w/v) PHB as carbon source, at 30°C and pH 8.0 for 12 days of incubation period.